

POSITIONING AND/OR ASSEMBLY AID AND CORRESPONDING PROCESS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Application No. PCT/EP02/04019, filed April 11, 2002. This application claims the benefit of German Patent Application DE 101 19018.2 filed April 18, 2001. The disclosures of the above applications are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a positioning and/or assembly aid for devices for machining at least one component by using at least one connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like and to a process for positioning components in a device for machining at least one component while using at least one connecting element such as a rivet, punch rivet, blind rivet, weld nut, weld stud, clip or the like.

BACKGROUND OF THE INVENTION

[0003] Known devices for processing at least one connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like are, for example, punch rivet systems, nut welding systems, stud welding systems, weld fast systems, plastifast systems, blind rivet systems, rivet nut systems or the like. They are used manually, on robots and/or stationarily, for

example in mass production of motor vehicles, wherein the connecting element is to be centred, preferably automatically, at a certain position respectively to a component, generally a metal sheet, waiting to be machined.

[0004] Accordingly, in prototype construction, for example of a new motor vehicle, appropriate hand devices for processing a connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like are generally used. In manual and/or stationary hand units of this type, in particular positioning of the connecting element itself is also to be carried out manually and this is generally only possible by using relatively expensive auxiliary devices such as templates, combs, masks or the like. Therefore, the position of the connecting element is often also marked by scoring on the component. However, it is not easy to accurately coincide with this mark, depending on the size and geometry of the component, as in some cases no auxiliary devices such as templates etc. can be used.

SUMMARY OF THE INVENTION

[0005] The object of the present invention is to provide a positioning and/or assembly aid which improves on the state of the art and a corresponding process. In particular, the expensive auxiliary devices known in the state of the art are to be omitted.

[0006] This object is achieved according to the invention by a positioning and/or assembly aid according to the claims.

[0007] The positioning and/or assembly aid according to the invention for devices for machining at least one component while using at least one connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like is characterised in that means for producing a light or laser beam are provided which can be aligned from a reference position towards a reference point. Utilization of a light or laser beam advantageously avoids the production and use of expensive auxiliary devices such as templates, combs, masks or the like and accordingly helps to reduce costs in prototype construction.

[0008] The reference position is preferably outside of the device, in particular clearly outside a machining space of the device bridged by a machining vertical line.

[0009] In contrast, the reference point is preferably located on the machining vertical line which preferably extends through the centre of a support of the device.

[0010] According to a further embodiment of the invention the reference point is arranged at a distance from the support, in particular arranged at an adjustable distance, preferably increased by the material thickness of the at least one component to be machined. In manually operated hand units in prototype construction the reference point is preferably adjusted by manual means. Projecting of the reference point on the support corresponds, for example, to a starting position or a zero point. By means, for example of a spindle, the reference point can now be varied in such a way that it is arranged at a distance from the support. The distance from the support preferably

corresponds in this case to the component thickness, for example, the thickness of one or more metal sheets to be processed. Automatic adjusting means are, however, also possible. They are preferably used in defined mass production and advantageously allow automatic processing not only of a certain component but also of various components such as metal sheets with different thicknesses, advantageously also in succession on an automatic production line.

[0011] According to the invention the light or laser beam is preferably obliquely directed from outside of the device onto the reference point. This is advantageous both in manual prototype construction and in automated mass production. Therefore, the angular position of the means producing the light beam ensure in an advantageous manner that the reference point is correctly hit only from a quite specific height. This height preferably coincides with a basic or starting position of the device or else a position characterising the machining and which the device adopts either once or cyclically and advantageously facilitates optionally automated machining even of different components in succession.

[0012] According to the invention the light or laser beam can preferably be variably projected and/or focussed, in particular as a point or as a diameter of the connecting element, onto the component.

[0013] The light or laser beam preferably co-operates alternatively or cumulatively with a template in such a way that device-related interference contours, such as the diameter of a mouthpiece of the device or the diameter of the support and also other geometric shapes such as square, triangle, ellipse or the like, can be projected and/or focussed onto the component. The ability to

simulate interference contours such as mouthpieces, holding devices, supports or the like in particular advantageously avoids carrying out operating process steps outside of a defined operating space and therefore in particular protects the component from accidental damage or even destruction.

[0014] The process according to the invention for positioning components in a device for machining at least one component while using at least one connecting element such as rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like comprises a positioning and/or assembly aid according to the invention and is characterised in that a mark is initially made on the top of at least one uppermost component and the component mark and the light or laser beam are then positioned congruently one above the other. In hand units in prototype construction positioning is preferably carried out manually but can also be automated when the invention is used in mass production, for example, by using an optical positioning system.

[0015] According to the invention the mark preferably has the shape of a crosshair, a point or another shape, in particular the shape of the connecting elements to be processed, or, a generally device-related, interference contour.

[0016] The invention advantageously allows positioning of components in a device for machining at least one component by using at least one connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like, and also positioning of a device of this type itself, in particular a manually operable hand unit, on a component with simple means. It

can also advantageously be retrofitted simply and relatively inexpensively in the known existing devices.

[0017] Further advantages and details of the invention will be described with the aid of an embodiment of a so-called SPR unit i.e. a setting machine, for example for weld studs or rivets, shown in the drawings but to which the invention is not restricted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In the drawings:

[0019] Fig. 1 is an elevational view of a positioning and/or assembly aid according to the invention for devices for machining at least one component while using at least one connecting element such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like; and

[0020] Fig. 2 is an elevational view of the positioning and/or assembly aid according to Fig. 1 in an enlarged detail.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Fig.'s 1 and 2 show a positioning and/or assembly aid 2 according to the invention for devices 1 for machining at least one component 3, 4 while using at least one connecting element 5 such as a rivet, punch rivet, blind rivet, rivet nut, weld nut, weld stud, clip or the like. A so-called memory test routine unit is shown as device 1, on which means 6 for producing a light or laser beam 7 are arranged. The light or laser beam 7 can be aligned from a reference

position 11 towards a reference point 12, the latter defining the machining point of connection element 5 and component 3, 4 in the device 1. Like the positioning and/or assembly aid 2, the reference position 11 is also located outside the device 1, in particular clearly outside of a machining vertical line 13. This preferably extends through the centre of a support 8 which can be a tool, for example a lower die 8 as in the present case, or another suitable counterforce structure. The machining vertical line 13 also defines the centre line of a machining clearance zone 14 located between the lower die 8 and a mouthpiece 9 or the device 1. The reference or machining point 12 is also located on the machining vertical line 13, albeit at a distance from the lower die 8, in particular increased by the material thickness of the at least one component 3, 4 to be machined. The above-mentioned distance can advantageously be adjusted in a defined manner, in particular appropriately increased, if a plurality of components are to be machined simultaneously, as in the case shown, if an upper 3 and a lower 4 component are to be machined at the same time. The light or laser beam 7 is also directed obliquely from outside of the device 1 onto the reference or machining point 12, so this advantageously strikes accurately only at a quite specific height.

[0022] The light or laser beam 7 can preferably be variably projected and/or focussed on to the reference or machining point 12, in particular as a point or as a diameter of the connecting element 5.

[0023] The light or laser beam 7 can alternatively or cumulatively also co-operate with a template 10 shown in Fig. 2 in such a way that interference

shapes such as the diameter of a mouthpiece 9 of the device 1 or the diameter of the lower die 8 and other geometric shapes such as a square, triangle, ellipse or the like can also be projected and/or focussed. In addition, Fig. 2 shows the positioning and/or assembly aid according to Fig. 1 in an enlarged detail.

[0024] The present invention is in particular suitable for devices such as punch rivet systems, nut welding systems, stud welding systems, weld fast systems, plastifast systems, blind rivet systems, rivet nut systems or the like, in particular for corresponding manually operable hand devices in prototype construction, preferably the motor vehicle industry.